

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Elochoman River Type N Coho- Future Farmers Of America Cooperative Program
Species or Hatchery Stock	<i>Oncorhynchus kisutch</i> Coho Salmon
Agency/Operator	Washington Department of Fish & Wildlife
Watershed and Region	Columbia Estuary Subbasin/Columbia River Estuary Province
Date Submitted	nya
Date Last Updated	August 16, 2004

Section 1: General Program Description

1.1 Name of hatchery or program.

Elochoman River Type N Coho- Future Farmers Of America Cooperative Program

1.2 Species and population (or stock) under propagation, and ESA status.

Coho Salmon (*Oncorhynchus kisutch*)

ESA Status: One of 21 artificial propagation programs proposed for listing (NOAA 69 FR 33101; 6/14/2004).

1.3 Responsible organization and individuals.

Name (and title):	Aaron Roberts
	Lower Columbia Hatchery Complex Manager
Agency or Tribe:	Washington Department of Fish and Wildlife
Address:	600 Capitol Way North, Olympia, Wa 98501
Telephone:	(360) 673-4400
Fax:	(360) 673-2995
Email:	robertsa@dfw.wa.gov

Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
National Marine Fisheries Service	Program Funding Source/Administrator (Mitchell Act)
Future Farmers of America	Cooperative Operating FFA Pond, located on Bernie Creek (City Limits of Cathlamet, WA)

1.4 Funding source, staffing level, and annual hatchery program operational costs.

Funding Sources	
Mitchell Act	
Operational Information	Number
Full time equivalent staff	4.5
Annual operating cost (dollars)	\$380,000

The above information for full-time equivalent staff and annual operating cost applies cumulatively to Elochoman River Anadromous Fish Programs and cannot be broken out specifically by program.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Elochoman River Type N Coho Salmon
Broodstock collection location (stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 11.3/Elochoman
Adult holding location (stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 11.3/Elochoman
Spawning location (stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 11.3/Elochoman
Incubation location (facility name, stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 11.3/Elochoman
Rearing location (facility name, stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 11.3/Elochoman; and Future Farmers of America Rearing/Acclimation Pond/Bernie Creek/0.1 RKm/Columbia Estuary

1.6 Type of program.

Integrated Harvest - (Lower Columbia River)

The proposed integrated strategy for this program is based on WDFW's assessment of the genetic characteristics of the hatchery and local natural population, the current and anticipated productivity of the habitat used by the populations, the potential for successfully implementing an isolated program, and NMFS' proposed listing determination (69 FR 33102; 6/14/2004). Modification of the proposed strategy may occur based upon NMFS' final listing determination and as additional information are collected and analyzed.

1.7 Purpose (Goal) of program.

The purpose of this hatchery program is to provide harvest and educational benefits as per the Future Farmers of America (Wahkiakum High School). This is an educational program that augments the harvest in the Columbia River and, in conjunction with habitat restoration work, will also seek to re-establish natural production in Bernie Creek in the future. Education, the environment, and the economic development of Wahkiakum County were the focus of the Cathlamet Future Farmers of America (FFA) chapter in their community development program. Beginning in 1989, the project G.E.N.E.S.I.S. (Generating Environment Necessary to Ensure Salmon in Streams) entailed a combination multi-year, multi-project effort that included a salmon rearing project, restoring a neglected wetland, continued construction on a 50' x 96' agriculture science building, 100 acre forest farm management program, salmon hatchery spawning assistance program, and a diverse community safety program.

The G.E.N.E.S.I.S. project is a community based effort involving groups and volunteers from Wahkiakum County, the City of Cathlamet, FFA alumni, private contractors, government agencies, Salmon for All (a non profit organization that advocates for the rights and concerns of commercial fishers), and the U.S. Army Corps of Engineers. The initial effort began when the groups cleared, cleaned and fenced a 190-ft. salmon rearing raceway and constructed a 35-foot dam. Since 1989, they have raised about 4.5 million salmon, roughly about 500,000 per year. They initially raised fall chinook salmon smolts that they received from the Washington Department of Fish and Wildlife's Elochoman Hatchery. Fall chinook were raised because of their commercial economic value. At the time when the project was being drafted the Cathlamet

area was facing some economic and environmental challenges resulting from the decline in timber, fishing, and farming job opportunities.

1.8 Justification for the program.

Programs originating from the Elochoman Type N coho program are for coho mitigation and augmentation and are funded through the Mitchell Act via National Marine Fisheries Service (NMFS) for the purpose of mitigation for lost fish production. The program is authorized under the Columbia River Fisheries Development Program, Columbia River Fish Management Plan and U.S. vs. Oregon and the parties to this program are, therefore, involved in short and long-term production planning. The "Mitchell Act" (Act) (Public Law 75-502) was passed in 1938. The Congressional motivation for its passage was recognition that the salmon fishery of the Columbia River was in a serious and progressive decline due to habitat destruction and alteration from dam construction and operation, deforestation and other forest practices, pollution, water diversions, and over fishing. This program is intended to supplement the LCR coho ESU component. Legal justification includes: Mitchell Act, Pacific Northwest Electric Power Planning and Conservation Act, and U.S. v Oregon court agreements.

The G.E.N.E.S.I.S. project has provided an invaluable learning experience for many students growing up in Wahkiakum County. Students have participated in numerous hands on science projects and collect data on a weekly basis. Students have also teamed up with the Columbia River Estuary Study Taskforce (CREST), and have collected water quality data that will be used to help create a base map of the region. Students are working on a nutrient enhancement project where they are placing salmon carcasses back into Bernie Creek. They also assist Elochoman Salmon Hatchery personnel in the spawning of salmon.

The G.E.N.E.S.I.S. project is a key component in the community's well-being and future. The concepts and ideas it has brought forth have stimulated leadership, citizenship, and technical knowledge, which has served as the catalyst for action by providing solutions to pressing community problems. Examples of habitat restoration that can be viewed when visiting this site, include a 190-ft. section of Bernie Creek that now serves as a "natural raceway," which provides rearing habitat for coho smolts from late February till the end of May. Above the raceway is a restored wetland that increases the overall productivity of the stream and allows the smolts to feed on insects rather than relying entirely on fish pellets. A concrete dam is opened in late May to allow smolts to leave the raceway. Upstream from the wetland, habitat has been created. This was done by placing logs into the streams that now allow pools to form during low water years.

In order to minimize impact on listed fish by WDFW facilities operation and the FFA Elochoman Type N coho program, the following Risk Aversion are included in this HGMP:

Table 1. Summary of risk aversion measures for the FFA Coho program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	Water withdrawal and intake screening have not been assessed for compliance. The pond outlet structure allows fish passage. Production and feed amounts do not exceed requirements needed for NPDES permit.
Intake Screening	4.2	
Effluent Discharge	4.2	
Broodstock Collection & Adult Passage	7.9	Not applicable, broodstock collection or passage is not part of this HGMP. See Elochoman River Type N Coho HGMP.
Disease Transmission	7.9, see also 10.11	<i>Fish Health Policy in the Columbia Basin.</i> Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, <i>Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries</i> (Genetic Policy Chapter 5, IHOT 1995).
Competition & Predation	See also 2.2.3, 10.11	Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish. See Elochoman River Type S Coho HGMP.

1.9 List of program "Performance Standards".

See section 1.10

1.10 List of program "Performance Indicators", designated by "benefits" and "risks".

1.10.1 Benefits: Note: Most of these Performance indicators pertain to Elochoman Hatchery portion.

Benefits		
Performance Standard	Performance Indicator	Monitoring & Evaluation
Assure that hatchery operations support Columbia River fish Mgt. Plan (<i>US v Oregon</i>), production and harvest objectives	Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Achieve a 10-year average of 1.56 % smolt-to-adult survival (range of .03 - 3.32%) that includes harvest plus escapement (Elochoman Type N coho)	Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock need.
Maintain outreach to enhance public understanding, participation and support of Washington Department of Fish & Wildlife (WDFW) hatchery programs	Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the facility to better understand hatchery operations. Off station efforts may include festivals, classroom participation, stream adoptions and fairs.	Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program. Record on-station organized education and outreach events.
Program contributes to fulfilling tribal trust responsibility mandates and treaty rights	Follow pertinent laws, agreements, policies and executive and judicial orders on consultation and coordination with Native American tribal governments	Participate in annual coordination meetings between the co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process).
Implement measures for broodstock management to maintain integrity and genetic diversity (At Elochoman Hatchery) Maintain effective population size Limit out of basin transfers Maximize available Natural-Origin Broodstock at Elochoman Hatchery	A minimum of 500 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return (At Elochoman Hatchery)	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. (WDFW 1983)
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	Use mass-mark (100% adipose-fin clip) for selective fisheries.	Returning fish are sampled throughout their return for length, sex, and marks.
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly for pathogens at Elochoman Hatchery and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy
	Inspection of adult broodstock for pathogens and parasites	At spawning, lots of 60 adult broodstock are examined for pathogens (Elochoman Hatchery)
	Inspection of off-station fish/eggs prior to transfer to hatchery	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.

Cathlamet High School FFA Type N Coho Program HGMP

1.10.1 Risks:

Risks		
Performance Standard	Performance Indicator	Monitoring & Evaluation
Minimize impacts and/or interactions to ESA listed fish	Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (17.0 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. Mass mark production fish to identify them from naturally produced fish (except CWT only groups)	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, in stream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented.
Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance WDFW water right permit compliance	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and in stream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities	WDFW completes an HGMP and is issued a federal and state permit when applicable.	Identified in HGMP and Biological Opinion for hatchery operations.
Harvest of hatchery-produced fish minimizes impact to wild populations	Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	Harvests are monitored by agencies and tribes to provide up to date information.

1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

Broodstock not collected for this program. See Elochoman Type N coho HGMP

1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	15,000 FBD	17.0	Mid April- Early May	Bernie Creek, Tributary to the Columbia River Estuary (Located within City Limits of Cathlamet, WA)	0.1	Columbia Estuary	Columbia River Estuary

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

No data are available for this program although adult coho returns are to be monitored in Bernie Creek. SARs could perform at similar levels to Elochoman Type N coho. See Elochoman HGMP.

1.13 Date program started (years in operation), or is expected to start.

This program started releases in 1999.

1.14 Expected duration of program.

The program is to continue until self-sustaining population densities are achieved or the program changes to the benefit of the listed chum segment in the Lower Columbia ESU.

1.15 Watersheds targeted by program.

Lower Columbia River

1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

1.16.1 Brief Overview:

This is an educational program that augments the harvest in the Columbia River and provides for restoration of coho production in Bernie Creek. Installation of new passage structures increased the habitat accessible to salmon and the FFA is annually monitoring the success of spawning in the stream. This program should be continued until self-sustaining population densities are achieved, but without more intensive monitoring and evaluation, it will be difficult to determine when this is achieved.

1.16.2 Potential Alternatives to the Current Program:

Alternative 1: Change to propagation of chum. Now that primary chum genetic units in the lower Columbia River have been identified, it may be possible to augment chum production in Bernie Creek using nearby stock (Grays River).

1.16.3 Potential Reforms and Investments:

Reform/Investment 1: Monitoring and evaluation of the habitat interaction, production, and the carrying capacity of listed species in this tributary should be implemented.

Reform/Investment 2: If the program is changed to enhance chum, small vessels would need to be built at the Elochoman Hatchery.

Section 2: Program Effects on ESA-Listed Salmonid Populations

2.1 List all ESA permits or authorizations in hand for the hatchery program.

For programs from Elochoman Hatchery, past Co-op programs (Chinook) were described in “Biological Assessment For The Operation Of Hatcheries Funded by The National Marine Fisheries Service” (March 99)”. During 2004, WDFW is writing HGMP’s to cover all programs produced from and released at Elochoman Hatchery and co-op facilities.

2.2 Provide descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

The following ESA listed natural salmonid populations occur in the subbasin where the program fish are released:

ESA listed stock	Viability	Habitat
Fall Chinook	H	M
Chum- Natural	L	L
Coho- Hatchery and Natural (Proposed)		
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

Identify the ESA-listed population(s) that will be directly affected by the program.

Lower Columbia River Coho (*Oncorhynchus kisutch*) has been proposed for listing as “threatened” on June 14, 2004.

Identify the ESA-listed population(s) that may be incidentally affected by the program.

Lower Columbia River fall chinook salmon (*Oncorhynchus tshawytscha*) are federally listed as “threatened” under the Endangered Species Act.

Columbia River chum salmon (*Oncorhynchus keta*) - Mainstem chum were listed as “threatened” under the ESA on March 25, 1999.

2.2.2 Status of ESA-listed salmonid population(s) affected by the program.

- Describe the status of the listed natural population(s) relative to “critical” and “viable” population thresholds

Critical and viable population thresholds have not been established for these ESUs and the populations within them. NMFS has formed a Lower Columbia River/Willamette River Technical Review Team to review population status within these ESUs and develop critical and viable population thresholds.

Lower Columbia River Coho (*Oncorhynchus kisutch*) has been proposed for listing as “threatened” on June 14, 2004.

Status: NMFS concludes that the LCR coho ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers. Twenty-one artificial propagation programs are considered to be part of the ESU as NMFS has determined that these artificially propagated stocks are genetically no more than moderately divergent from the natural populations. Elochoman River wild coho run is a fraction of its historical size. USFWS surveys in 1936 and 1937 indicated coho presence in all accessible areas of the Elochoman River and its tributaries:

371 coho documented in Elochoman River; coho designated as ‘observed’ in Skamakowa. In 1951, WDFW estimated an annual escapement of 2,500 late coho to the Elochoman River and 2,000 late coho to Skamakowa Creek. Hatchery production accounts for most coho returning to Elochoman River. Natural coho production is presumed to be very low. A Smolt density model estimated Elochoman basin production potential of 43,393 smolts. (LCFRB Elochoman Subbasin Report, Volume 11, Chapter 5). In the past five years, returns to the rack of hatchery adults have ranged from 583 (1998) to 7,349 (2001). A majority of these fish are released upstream along with wild coho. Wild coho numbers have ranged from 36 fish in 2001 to 216 in 2000.

Lower Columbia River fall chinook salmon (*Oncorhynchus tshawytscha*) within the Evolutionary Significant Unit (ESU) are federally listed as “threatened” under the Endangered Species Act effective May 24, 1999.

Status: In Washington, the LCR chinook ESU includes all naturally spawned chinook populations from the mouth of the Columbia River to the Cascade Crest. In 1950, estimated annual escapement of fall chinook in the Elochoman River was 2,000 fish (WDF 1951). Today, the most heavily spawned area is in the main river above tidewater. A weir just above tidewater is used to collect fall chinook for the hatchery. When the hatchery has reached its egg-take goal, the remaining fish are allowed to proceed into the watershed and spawn naturally. On favorable flows they could go as high as the dam at the hatchery at RM 9.2 and fall chinook can spawn naturally from RM 3 to RM 11.3. Access above the Elochoman Hatchery is limited by the intake weir. Entry of adults into the sub-basin occurs from early September to November. Natural escapement estimates for the Elochoman River has averaged 636 fish during 1987 through 2000. Spawning occurs from late September to mid-November with a peak usually in mid-October. Mark sampling on the spawning grounds indicates natural spawners are largely hatchery origin. SaSI (2002) considers this population to be heavily hatchery origin and lists it as healthy. There is no information relating to survival rates for naturally produced fall chinook, but the survival to fisheries of Elochoman Hatchery fall chinook ranged from 0.06% to 0.9% (Byrne et al., 1998). Information is limited, but utilizing tag recoveries from the Washington Missing Production Groups Program, it was estimated that in 1996 the natural production was 65% and in 1997 it was 11%.

Table 2. Fall chinook salmon abundance estimates in the LCMA (FMEP 2003)

Year	Cowee- man River	Elocho- man River	Grays River	Skamo- kawa Creek	Cowlitz River	Green River	Toutle River	Kalama River	EF Lewis River	NF Lewis River	Washougal River	Wind River Bright	Wind River Tule
1990	241	136	287	123	2,698	123		20,54	342	17,506	2,062	177	11
1991	174	178	188	123	2,567	123	33	5,085	230	9,066	3,494	269	52
1992	424	190	4	150	2,489	150		3,593	202	6,307	2,164	51	54
1993	327	274	40	281	2,218	281	3	1,941	156	7,025	3,836	686	0
1994	525	688	47	516	2,512	516	0	2,020	395	9,939	3,625	1,101	11
1995	774	144	29	375	2,231	375	30	3,044	200	9,718	2,969	278	4
1996	2,148	508	351	667	1,602	667	351	10,630	167	14,166	2,821	58	166
1997	1,328	1,875	12	560	2,710	560		3,539	307	8,670	4,529	220	148
1998	144	220	93	1,287	2,108	1,287	66	4,318	104	5,929	2,971	953	202
1999	93	707	303	678	997	678	42	2,617	217	3,184	3,105	46	126
2000	126	121	89	852	2,700	852	27	1,420	323	9,820	2,088	25	14
2001	646	2,354	251	4,951	5,013	4,951	132	3,714	530	15,000	3,901	217	444
2002	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na

Columbia River chum salmon (*Oncorhynchus keta*) Mainstem Chum within the lower Columbia River Evolutionary Significant Unit (ESU) are federally listed as “threatened” effective May 24, 1999.

Status: Historically, chum salmon were abundant in lower portions of the Columbia River and supported annual harvests of hundreds of thousands of fish. Chum salmon are native to the Elochoman River and although natural production is much reduced over historic levels, a small remnant run still returns to spawn. Washington Department of Fisheries reports for the Lower Columbia River Fishery Development Program in 1951 estimated chum escapement in the Elochoman River to be about 1,000 fish, spawning mainly in the lower reaches of the main river above tidal influence. This was in the period when Columbia River chum stocks declined precipitously. In 1973, the Washington Department of Fisheries reported a small run to the river.

Directed spawning ground surveys are not conducted in the Elochoman River for chum and no estimates are available on current run size or biological characteristics of the stock. Similar data for Grays River chum should be applicable. Adults migrate into the river from mid-October through November with peak spawner abundance occurring in late November. Scale analysis indicates 3- and 4-year-old fish are the dominant age classes. A few fish return as 5-year-olds, but none as 2-year-old jacks. Males predominate in the 5-year-old class.

Recent stream enhancement work by the Washington Department of Fisheries in the Grays River watershed at Gorley Springs has been relatively successful and may increase basin chum production by providing a stable incubation environment. The same kind of project could support rebuilding the Elochoman River chum stock. It is expected that suitable sites are available for such projects. Occasional releases of chum fry have been made in the basin. Egg-box programs in 1978, 1979 and 1980 released 50,000, 376,000 and 475,000 fry (Hood Canal stock), respectively. The present low numbers of chum in the Columbia River made it necessary to use stock from outside the area. No spawning ground surveys were conducted in subsequent years to determine the success of these releases. The Elochoman River Salmon Hatchery does not raise chum and planners anticipate that any future supplementation of the run would be through the use of portable egg incubators and direct release of emergent fry or short-term rearing (up to one month) in portable raceways and on-site release of the fed fry

Table 3. Peak spawning ground counts for chum salmon in index reaches in the LCMA (M Groesbeck WDFW; Streamnet).

Fall Chum Return Year	Grays River	Hamilton Creek	Hardy Creek					
	Mainstem	West Fork	Crazy Johnson Creek	Total	Spawning Channels		Total	
					Hamilton	Spring		
1990	569	0	117	686	35	16	51	192
1991	327	37	239	603	8	11	19	206
1992	3,881	491	374	4,746	141	8	149	1,153
1993	2,334	113	91	2,538	16	4	20	395
1994	42	0	105	147	47	22	69	435
1995	219	0	483	702	4	16	20	214
1996	1,302	408	463	2,173	5	81	86	273
1997	79	55	485	619	31	114	145	105
1998	154	214	145	513	43	237	280	443
1999	222	100	927	1,249	17	165	182	157
2001	1,124	833	249	2,206	56	143	199	20
2002	448	1,630	1,260	3,338	226	462	688	498
2003								

2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.

Describe hatchery activities: The following activities listed below are identified as general hatchery actions that are identified in the ESA Section 7 Consultation “Biological Opinion on Artificial Propagation in the Columbia River Basin” (March 29, 1999).

Broodstock Program:

Broodstock Collection: From Elochoman Hatchery - Type N coho begin entering the Elochoman system in late October thru December and arrive at the Elochoman Hatchery during this time. The tide water weir at Foster Road (RKm 3.0) that blocked earlier Chinook for broodstock collection has been removed by this time. Coho are diverted into a ladder that leads to the adult collection pond. In 2004, WDFW will propose to maximize the number of natural origin fish into the broodstock. Any non-target listed fish that can be identified that enter the pond during this time are monitored and released upstream of this point. Region 5 fish program staff plans upcoming adult handling in a preseason meeting with hatchery staff and there is staff communication to best handle unforeseen or weather related events that can impact runs and procedures. Take not associated with the Bernie Creek program directly.

Genetic introgression: Both early and late coho stocks are probably represented on the spawning grounds in the Elochoman River today. Late stock coho (or Type N) used in the FFA program were historically present in the Elochoman basin with spawning occurring from late November into March. Use of the late coho was chosen to take advantage of the later fall timing when stream flows and habitat are available. There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the sub-basin. Elochoman coho programs are proposed to be integrated in 2004 and the Bernie Creek coho will be a part of that stock. Indirect take from genetic introgression is unknown.

Rearing Program:

Operation of Hatchery Facilities: The FFA rearing pond draws water from Bernie Creek. Designs are in process that will correct passage problems associated with fish screens at the mouth of Bernie Creek. This program is being used in conjunction with on-going habitat improvements with little or no populations being affected within Bernie Creek. Indirect take from this operation is unknown.

Disease: Coho are transferred in late winter from February-March. Little problems are associated with fish at this the time as water temperatures are still low as are pond loadings that could occur later in the spring. This short-term acclimation and rearing program has experienced little problems due to the numbers and total pounds involved with this program. Protocols for fish health such as reporting any problems, monitoring fish loss are followed as per Elochoman Hatchery staff instructions. Indirect take from disease is unknown.

Release:

Hatchery Production/Density-Dependent Effects: The 15,000 fish release was determined by Region 5 staff to be an appropriate number of fish for the restoration effort and habitat available for future seeding. This level will remain until monitoring indicates some level of self-sustaining production is apparent. Indirect take from hatchery production is unknown.

Competition: This program is being used in conjunction with on-going habitat improvements with little or no populations being affected within Bernie Creek. As fish will be released as active

smolts, there will be minimal impact on resident fish in the immediate area. Indirect take from competition is unknown.

Predation (Freshwater): When discussing predation by mostly yearling fish (both hatchery and wild) the magnitude of predation will depend upon the characteristic of the population, the habitat in which the population occurs, overall food availability (besides fish) and the characteristics of the hatchery program (e.g., release time, release location, number released, and size of fish released). In the absence of site-specific empirical information, the identification of risk factors can be a useful tool for reviewing hatchery programs while monitoring and research programs are developed and implemented.

Predation Risk Factors:

Environmental Characteristics: These characteristics can influence the level of predation (see SIWG (1984) for a review) with risk greatest in small systems during periods of low flow and high clarity. Bernie Creek is a small sized rain fed stream with the rearing site close to the entrance to the Columbia River. Approximately 5.0 RKm is potential habitat. Release of these fish has a short distance of less than a half mile to disperse to Birnie Slough and mainstem Columbia.

Dates of Releases: Coho smolts are released starting early May specifically to minimize impact with listed chum in the area.

Relative Body Size: Studies and opinions on size of predator/prey relationships vary greatly and although there is evidence that salmonids can prey upon fish up to 50% of their body length, most prey consumed is probably much smaller. Keeley and Grant (2001) suggest that the mean prey size for 100-200 mm fl salmonids is between 13-15% of predator body size. Salmonid predators were thought to be able to prey on fish up to approximately 1/3 of their length (USFWS 1994), although coho salmon have been observed to consume juvenile chinook salmon of up to 46% of their total length in aquarium environments (Pearsons et al. 1998). Artic char are well known as piscivorous predators, but recent studies suggest the maximum prey size is approximately 47% of their length (Finstad et al. 2002). The “33% of body length” criterion for evaluating the potential risk of predation in the natural environment has been used by NOAA Fisheries and the USFWS in a number of biological assessments and opinions (c.f., USFWS 1994; NMFS 2002). Although predation on larger chinook juveniles may occur under some conditions, WDFW believes that a careful review of the Pearson and Fritts (1999) study supports the continued use of the “33% of body length criterion” until further data for this system can be collected.

With this wide variation of information on size of predator on prey relationships (13-50%) range, the best information available indicates the 33% predator prey length ratio is valid until further data for these streams can be collected. Below are some of the data that is available for chinook fry and fingerling lengths from area Lower Columbia streams:

- Lengths from the Lewis River system during the month of June indicate fish 48-55 mm fl (Columbia River Progress Report 2003-16). The Lewis River system fall chinook stock timing though is the latest for the Columbia tributary stocks, and considered to be the worst case scenario (smaller size) when compared to other Columbia River systems.
- Abernathy Creek (WRIA 25) indicated lengths of 36mm – 40mm from March to April 1 (Pat Hanratty, WDFW, pers comm. 2004). Growth for wild chinook from Abernathy Creek from the first of April to May 1 is unknown.
- Average fork length, by week from 26 sampling sites on the Kalama River, indicate fish 44 mm fl (April 25), 46 mm fl (May 3), 56 mm fl (May 11) and 62 mm fl (May 18)

- 16). Other lengths through August are available (R.Pettit, WDFW, pers. comm.).
- Fork lengths from Cedar Creek (tributary to the N.F. Lewis River) indicate that average chinook lengths reach approximately 50 mm fl between the weeks of April 12 and April 19, 2004, and are growing rapidly with fish 55-60 mm fl by April 26 and May 3, 2004.

Potential Bernie Creek Type N coho predation and competition effects on listed salmonids: The proposed annual production goal for this program is 15,000 fish. Bernie Creek starts volitional releases in early May. This window of release could encounter listed fish in the Elochoman sub-basin and Columbia mainstem. Yearling hatchery coho smolts would not likely compete for food or habitat with fingerling stocks of chinook or steelhead in regards to food and habitat (Section 7). At 13 FPP (142 mm fl), potential predation on listed chinook would be on fish of 46-47 mm fl and smaller. Due to the small release numbers, time of release and immediate dispersal into the mainstem Columbia opportunity for predation is likely low on chinook. Mean lengths from the Grays River Hatchery and Sea Resources (Chinook River) Chum Recovery programs indicate chum releases are 56.2 – 58.8 mm fl (in mid-March), 55.2 mm fl (late March), and 54.6 mm fl in mid-April (Lower Columbia Chum HGMP 2004). For the Duncan Creek and Ives Island Chum Recovery programs, fish are released at 1.0-1.5 grams or 50-55 mm fl on a staggered basis from mid-March through May (Bonneville Population of Columbia River Chum Salmon HGMP 2004). Risk to chum would be low due to the size of the chum at release and dispersal before the coho are released. Indirect take from predation is unknown on Chinook and chum.

Residualism: To maximize smolting characteristics and minimize residualism:

- WDFW adheres to a combination of acclimation, volitional release strategies, size, and time guidelines.
- Condition factors, standard deviation and coefficient of variation are monitored and measured through out the rearing cycle and adjusted towards the release time for optimum smolt conditions.
- Releases have occurred from acclimation facilities on the parent river.
- In 1996 and 1997, snorkeling studies were conducted on the Elochoman River to examine possible residualism and migration trends of coho (Type N and S) and fall Chinook releases. For 1996, a total of 1.7 million coho smolts were released in staggered periods from early April to mid-May. Snorkeling at 7 sites below the release point indicated no hatchery smolts remaining two weeks after the last release. Release strategies were a combination of volitional and forced. In 1997, a much reduced program of 300,000 coho smolts were volitionally released in mid-April and snorkeling surveys indicated that no hatchery coho were observed by early July. In 1998, after volitional and flush releases ending May 11, no hatchery coho were observed in the middle and lower reaches downstream of the release point one week later (Fuss, June 2000).

Indirect take from residualism is unknown.

Migration Corridor/Ocean: It is unknown to what extent listed fish are available both behaviorally or spatially on the migration corridor. Once in the mainstem Columbia, Witty et al. (1995) concluded that predation by hatchery production on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor. Evidence in estuarine and nearshore environments indicate that diets are often dominated by invertebrates with Durkin (1982) reporting that diet of coho smolts (128-138 mm fl) in the Columbia River estuary was composed almost entirely of invertebrates without evidence of salmonids as prey (HSRG 2004). There appears to be no studies demonstrating that large numbers of Columbia

system smolts emigrating to the ocean affect the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in the ocean. Indirect take from migration corridor or ocean is unknown.

Monitoring:

Associated Monitoring Activities - The following monitoring activities are conducted in the Lower Columbia Management Area (LCMA) for adult steelhead and salmon: redd surveys are conducted for winter steelhead in the SF Toutle, Coweeman, EF Lewis and Washougal rivers. Redd surveys are also conducted in the Cowlitz River for fall and spring chinook. Mark-recapture surveys provide data for summer steelhead populations in the Wind and Kalama rivers. Mark-recapture carcass surveys are conducted to estimate populations of chinook salmon in Grays, Elochoman, Coweeman, SF Toutle, Green, Kalama, NF Lewis, EF Lewis rivers and Skamokawa, Mill, Abernathy, and Germany creeks and for all chum salmon populations. Snorkel surveys are conducted for summer steelhead in the EF Lewis and Washougal rivers. Trap Counts are conducted on the Cowlitz, NF Toutle, Kalama, and Wind rivers and on Cedar Creek, a tributary of the NF Lewis River. Area-Under-the-Curve (AUC) surveys are conducted to collect population data for chum salmon in Grays River and Hardy and Hamilton creeks. All sampling of carcasses and trapped fish include recovery of coded wide tagged (CWT) fish for hatchery or wild stock evaluation. Downstream migrant trapping occurs on the Cowlitz, Kalama, NF Lewis and Wind rivers, Cedar Creek, and will expand to other basins as part of a salmonid life cycle monitoring program to estimate freshwater production and wild smolt to adult survival rates. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. (See Take Tables at the end of this document for identified levels).

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

Handling and release of wild steelhead and coho is monitored and take observations have been rare. Any additionally mortality from this operation on a yearly basis would be communicated to Region 5 Fish Program staff for additional guidance.

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

No data available

Section 3: Relationship of Program to Other Management Objectives

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. Hood Canal Summer Chum Conservation Initiative) or other regionally accepted policies (e.g. the NPPC Annual Production Review Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

Cathlamet Future Farmers of America (FFA):

Education, the environment, and the economic development of the Wahkiakum County were the focus of the Cathlamet Future Farmers of America (FFA) chapter in their community development program.

Production from Elochoman programs will be integrated with *U.S. v Oregon* and the Columbia River Fish Management Plan (CRFMP) and with hatchery plans documented in WDFW's yearly Future Brood Document (FBD), and Lower Columbia Fisheries Management and Evaluation Plan (2002 FMEP) which has been agreed to by NOAA for listed steelhead, chum, and chinook in the ESU. WDFW hatchery programs in the Columbia system adhere to a number of guidelines, policies and permit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. Following is a list of guidelines, policies and permit requirements that govern WDFW Columbia hatchery operations:

Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington. These guidelines define practices that promote maintenance of genetic variability in propagated salmon (Hershberger and Iwamoto 1981). Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

Spawning Guidelines for Washington Department of Fisheries Hatcheries. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be used to maintain genetic variability within the hatchery populations (Seidel 1983). Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).

Stock Transfer Guidelines. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

Fish Health Policy in the Columbia Basin. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

National Pollutant Discharge Elimination System Permit Requirements This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired.

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

The program described in this HGMP is consistent with the following agreements and plans:

- The Columbia River Fish Management Plan
- U.S. vs. Oregon court decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife Wild Salmonid Policy
- SAFE support
- MOA with Cathlamet High School and FFA (Cathlamet Future Farmers of America)

3.3 Relationship to harvest objectives.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Coho returning to the Columbia River are managed according to two major stocks. The early-returning fish are referred to as the south-turning or S-type fish because they contribute well to the more southern ocean fisheries. They are generally recognized as Toutle River origin fish. The late-returning coho are referred to as north-turning or N-type fish because they contribute more heavily to the northern ocean fisheries. They are generally recognized as Cowlitz origin hatchery fish.

The purpose of the majority of hatchery programs is to provide harvest opportunity. Hatchery coho are adipose-fin marked to allow quick identification of these hatchery fish intended for harvest while the presence of the adipose fin also allows for quick identification of wild stocks. With mass marking the agency staff has taken steps to identify natural coho stocks and handle them in a manner that would provide for their survival and reproduction yet maximizing harvest thus limiting hatchery coho on the spawning grounds. Harvest rates for Columbia River coho have averaged 74.2% in the mid 1980s (1985-89). The harvest rates then dropped to 48.8% (1997-98). With strong hatchery returns in the future, in conjunction with mass marking, aggressive harvest rates on hatchery coho might be achieved with minimal take on sub-basin natural coho in the future. Until recent years, natural produced Columbia River coho were managed like hatchery fish and subjected to similar harvest rates; ocean and Columbia River combined harvest rates ranged from 70% to over 90% during 1970-83. Ocean fisheries were reduced in the mid 1980s to protect several Puget Sound and Washington coastal wild coho populations. Columbia River commercial coho fishing in November was eliminated in the 1990s to reduce harvest of late Clackamas coho.

The majority of the catch is early coho, but late coho harvest can also be substantial. Since 1999, returning Columbia River hatchery coho have been mass marked with an adipose fin clip to enable fisheries to selectively harvest hatchery coho and release wild coho. Natural produced lower Columbia River coho are beneficiaries of harvest limits aimed at Federal ESA listed Oregon Coastal coho and Oregon state listed Clackamas and Sandy River Coho. During 1999-2002, fisheries harvest of ESA listed coho was less than 15% each year. Hatchery coho can contribute significantly to the lower Columbia River gill net fishery; commercial harvest of early coho in September is constrained by fall chinook and Sandy River coho management; commercial harvest of late coho is focused in October during the peak abundance of hatchery late coho. A substantial estuary sport fishery exists between Buoy 10 and the Astoria-Megler Bridge. An average of 1,183 coho (1981-1988) were harvested annually in the Elochoman River sport fishery. CWT data analysis of 1995-97 early coho released from Elochoman Hatchery indicates 49% were captured in a fishery and 51% were accounted for in escapement. CWT data analysis of 1995-97 brood late coho released from Elochoman Hatchery indicates 61% were captured in a

fishery and 39% were accounted for in escapement. Fishery CWT recoveries of 1995-97 brood Elochoman early coho were distributed between Columbia River (53%), Washington ocean (40%), and Oregon ocean (7%) sampling areas. Fishery CWT recoveries of 1995-97 brood Elochoman late coho were distributed between Columbia River (59%), Washington ocean (29%), and Oregon ocean (11%) sampling areas

3.4 Relationship to habitat protection and recovery strategies.

Cathlamet Future Farmers of America (FFA) and G.E.N.E.S.I.S:

Beginning in 1989, the project G.E.N.E.S.I.S. (Generating Environment Necessary to Ensure Salmon in Streams) entailed a combination multi-year, multi-project effort that included a salmon rearing project, restoring a neglected wetland, continued construction on a 50' x 96' agriculture science building, 100 acre forest farm management program, salmon hatchery spawning assistance program, and a diverse community safety program.

Subbasin Planning and Salmon Recovery:

The current Elochoman HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Draft Elochoman River Subbasin Summary May 17, 2002) is a broad-scale initiative that will provide building blocks of recovery plans by the Lower Columbia Fish Recovery Board (LCFRB) for listed fish and may well use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals. In order to assess, identify and implement restoration, protection and recovery strategies, Region 5 staff is involved in fish and wildlife planning and technical assistance in concert through the LCFRB including the role of fish release programs originating from Elochoman Complex.

Habitat Treatment and Protection

WDFW is presently conducting or has conducted habitat inventories within the Elochoman sub-basin. Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. It creates a model to predict fish population outcomes based on habitat modifications. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHAP), which documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis

A WRIA 25 (Grays-Elochoman) habitat limiting factors analysis (LFS) report has been completed by the Washington State Conservation Commission with the input of WDFW Region 5 staff. The Elochoman River suffers from severe habitat degradation (siltation, poor water quality). The primary land use activities responsible for these include: road building, timber harvesting, agriculture, and rural development. These upslope and riparian activities have increased sediment, altered woody debris availability and recruitment, increased water temperatures, changed runoff patterns, and reduced river flow.

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the Bernie Creek coho program and are taken from the Puget Sound listed and non-listed HGMP template (WDFW and NOAA 2003).

(1) Salmonid and non-salmonid fishes or species that could negatively impact the program: Bernie Creek coho smolts can be preyed upon through the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays along the Columbia mainstem sloughs can prey on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that can take a heavy toll on migrating smolts and returning adults include:

harbor seals, sea lions, river otters and Orcas.

(2) Salmonid and non-salmonid fishes or species that could be negatively impacted by the program: Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes evaluation of this net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. See also Section 2.2.3 Predation and Competition.

3) Salmonid and non-salmonid fishes or other species that could positively impact the program. Multiple programs including fall chinook, Type S coho and steelhead programs are released in the vicinity (Elochoman River) and limited natural production of chinook, coho, chum and steelhead occurs along with non-salmonid fishes (sculpins, lampreys and sucker etc.). Accept for yearling stocks (coho and steelhead), these species may serve as prey items during the emigration through the basin. While not always desired from a production standpoint, hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Successful or non-successfully spawner adults originating from this program may provide a source of nutrients in oligotrophic coastal river systems and stimulate stream productivity. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993; Slaney et al. 2003; Ward et al. 2003). The Elochoman River drainage is thought to be inadequately seeded with anadromous fish carcasses and coho carcasses can be used throughout the basin. Assuming integrated spawning and carcass seeding efforts, approximately 5,000 – 10,000 Type N coho adult carcasses could contribute approximately 25,000 – 50,000 pounds of marine derived nutrients to organisms in the Elochoman River. *Saprolegniasis* occurrences in young hatchery fish have been observed in greater frequency on Mitchell Act stations and in some cases, circumstantial evidence suggests more outbreaks of gill and tail fungus are the result of nutrient enhancement efforts. Staff is continuing to monitor observations or occurrences of this possibility.

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. Bernie Creek Type N coho smolts can be preyed upon through the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can prey on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts and returning adults include: harbor seals, sea lions, river otters and Orcas.

Section 4. Water Source

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.

The natural feature constructed pond used to rear fish is constructed in a wide spot in Bernie Creek. A dam at the end of the pond controls pond level and release structures. All available water flow of approximately 2 cfs gravity flows through the pond. Habitat improvement upstream include log weir grades and riparian zone restoration.

4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Hatchery water withdrawal	No actual withdrawal of water needed (in stream rearing site).
Intake/Screening Compliance	Designs are in process that will correct passage problems associated with fish screens at the mouth of Bernie Creek
Hatchery effluent discharges. (Clean Water Act)	No discharge permit is required. The amount of production falls below the minimum requirements for a NPDES permit.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

For sections 5.0 – 11.0, see also Elochoman Type N coho HGMP

5.2 Fish transportation equipment (description of pen, tank, truck, or container used).

Fish are transported to the FFA facility in March by 1000 gallon tanker truck from Elochoman. Transit time is less than 30 minutes.

5.3 Broodstock holding and spawning facilities.

See Elochoman Type N coho HGMP

5.4 Incubation facilities.

See Elochoman Type N coho HGMP

5.5 Rearing facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
1	FFA In stream Earthen Pond/Pool created by Concrete Structure with Fishway-Constructed by WDFW	24000	200	20	6.0	800-1000		0.3

5.6 Acclimation/release facilities.

Same, see section 5.6 above.

5.7 Describe operational difficulties or disasters that led to significant fish mortality.

The natural pond has not suffered significant mortality but natural predation occurs.

5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

This is a closed system without listed fish, nor are listed fish propagated. High school staff communicates with Elochoman Hatchery staff on operational, fish health or fish culture needs.

Section 6. Broodstock Origin and Identity

6.1 Source.

See Elochoman Type N coho HGMP

6.2.1 History.

See Elochoman Type N coho HGMP

6.2.2 Annual size.

See Elochoman Type N coho HGMP.

6.2.3 Past and proposed level of natural fish in the broodstock.

See Elochoman Type N coho HGMP. In 2004, WDFW will propose to maximize the number of natural origin fish into the broodstock.

6.2.4 Genetic or ecological differences.

The broodstock is derived from stock returning to the Elochoman sub-basin. Prior to the FFA coho program, fish (including coho), have not been observed in Bernie Creek, within the recent memory of locals. Thus, a native population does not exist in this stream. But program coho do represent native populations that inhabit other streams within the Elochoman and Columbia Estuary sub-basins. There are no known genotypic, phenotypic or behavioral differences between the hatchery and natural stocks in the target area. It is possible that both strains of coho have interbred both in the hatchery and in the wild. Also see Elochoman Type N coho HGMP.

6.2.5 Reasons for choosing.

The stock has a run entry pattern and timing that provides harvest opportunities for fisheries in the sub-basin, the lower Columbia mainstem/tributaries and the Washington coast.

6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Broodstock collection is done at Elochoman Hatchery.

- Integrating natural spawners will represent the natural type N coho run through out the season.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish, if identified, will be released immediately if encountered during the broodstock collection process.

Section 7. Broodstock Collection

7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Adults (see Elochoman Type N coho HGMP)

7.2 Collection or sampling design

See Elochoman Type N coho HGMP

7.3 Identity.

100% of the hatchery fish released are marked so that they can be available for harvest.

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults):

See Elochoman Type N coho HGMP

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

See Elochoman Type N coho HGMP

7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

See Elochoman Type N coho HGMP

7.6 Fish transportation and holding methods.

See Elochoman Type N coho HGMP

7.7 Describe fish health maintenance and sanitation procedures applied.

Fish transfers into the sub-basin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines.

7.8 Disposition of carcasses.

See Elochoman Type N coho HGMP

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

See Elochoman Type N coho HGMP

Section 8. Mating

8.1 Selection method.

See Elochoman Type N coho HGMP

8.2 Males.

See Elochoman Type N coho HGMP

8.3 Fertilization.

See Elochoman Type N coho HGMP

8.4 Cryopreserved gametes.

NA

8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

See Elochoman Type N coho HGMP

Section 9. Incubation and Rearing.

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

See Elochoman Type N coho HGMP

9.1.2 Cause for, and disposition of surplus egg takes.

See Elochoman Type N coho HGMP

9.1.3 Loading densities applied during incubation.

See Elochoman Type N coho HGMP

9.1.4 Incubation conditions.

See Elochoman Type N coho HGMP

9.1.5 Ponding.

See Elochoman Type N coho HGMP

9.1.6 Fish health maintenance and monitoring.

See Elochoman Type N coho HGMP

9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

See Elochoman Type N coho HGMP

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available.

See Elochoman Type N coho HGMP

9.2.2 Density and loading criteria (goals and actual levels).

The Bernie Creek rearing channel has approximately 24,000 cubic feet of space; maximum densities do not exceed .050 lbs/cf3 or exceed much more than one to one pound per gallon per minute (GPM).

9.2.3 Fish rearing conditions.

Dissolved oxygen readings and temperatures for Bernie Creek rearing channel are monitored.

9.2.4 Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Not available. Fish will grow from 20fpp to 13 fpp.

9.2.5 Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Not available.

9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Feed is fed 2-3 times weekly with Moore Clark Fry 2.0mm; feed rate is 0.9-0.8 percent daily with feed conversions approximately 1.10-1.0.

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

Fish Health Monitoring	A fish health specialist inspects fish monthly and checks both healthy and if present symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.
Disease Treatment	As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Fish health and/or treatment reports are kept on file.
Sanitation	All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Footbaths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

Not applicable, but fish exhibit typical increased smolt activity by gathering at the pond outlet towards May.

9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

The rearing channel is a natural 'in-stream' site with natural food available and interactions with natural predators.

9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

- At least 500 adults are available in the population.
- Listed coho will be collected through out the run time from adults arriving at the hatchery rack.
- Protocols for population size, fish health disinfection and genetic guidelines followed.
- Eggs water hardened in iodophor (1:600).
- Multiple incubation and rearing units are used.
- Staff is available 24/7 to respond to emergencies.
- IHOT guidelines are followed for rearing, release and fish health parameters.

Section 10. Release

10.1 Proposed fish release levels.

Age Class	Max. No.	Size (fpp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	15,000 FBD	13	Mid April- Early May	Bernie Creek, Tributary to the Columbia River Estuary (Located within City Limits of Cathlamet, WA)	0.1	Columbia Estuary	Columbia River Estuary

10.2 Specific location(s) of proposed release(s).

Same as above, see section 10.2

10.3 Actual numbers and sizes of fish released by age class through the program.

Yearling Release			
Release Year	No.	Date (MM/DD)	Avg Size (fpp)
2000	20000	April-May	17
2001	20000	April-May	17
2002	20000	April-May	17
2003	15,000*	April-May	17

10.4 Actual dates of release and description of release protocols.

Stoplogs from the outlet dam structure are removed and the pond is lowered over time. Release periods begin anytime close to May.

10.5 Fish transportation procedures, if applicable.

None needed.

10.6 Acclimation procedures (*methods applied and length of time*).

Acclimation & Release: Smolts (~20 fpp) are transported in early March from the Elochoman Hatchery to the Future Farmers of America pond, located on Bernie Creek, a small tributary to the Columbia River Estuary. Fish are reared, acclimated, and volitionally released at approximately 17 fpp from the FFA pond (Bernie Creek) during the period of mid April-early May. Note that the FFA pond does not have a screened outlet; but fish normally do not emigrate in significant numbers from the pond until mid-April.

10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

100% of the hatchery release is marked so that they can be distinguished from the natural population.

10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels

FFA Pond/Satellite: Does not Apply. The transfer of program fish from the Elochoman River Hatchery to the FFA pond is a pre-determined objective with the annual broodstock document. Thus, a surplus will not occur since all fish are programmed for release from the FFA pond.

10.9 Fish health certification procedures applied pre-release.

All fish are examined for the presence of “reportable pathogens” as defined in the PNFHPC disease control guidelines, within 3 weeks prior to release and up to 6 weeks on systems with pathogen free water or no history of disease.

Fish transfers into the sub-basin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines.

10.10 Emergency release procedures in response to flooding or water system failure.

FFA Pond/Satellite: Does not apply since fish can volitionally move out of pond at anytime.

10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

- The production and release of only smolts through fish culture and volitional release practices fosters rapid seaward migration with minimal rearing of delay in the rivers, limiting interactions with naturally produced steelhead juveniles.
- WDFW uses acclimation and release of smolts in lower river reaches where possible, this in an area below known wild fish spawning and rearing habitat. No listed fish currently utilize Bernie Creek.
- WDFW has programmed this educational and restoration project at a size appropriate for this project.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra- and inter-specific interactions with wild fish to assess and adjust, if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW will be reviewing Elochoman programs that drive the current release dates. Included in this discussion could be options to look at the possibility of pushing the release of this group to May 1st.
- WDFW fish health and operational concerns for Elochoman Hatchery programs are communicated to Region 5 staff for any risk management or needed treatment. See also section 9.7.

Section 11. Monitoring and Evaluation of Performance Indicators

11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Refer to Section 1.10 for a discussion of how each "Performance Indicator" will be monitored and evaluated. Additional coho interaction work is being conducted on the Lewis River which may have implications to Bernie Creek.

The proportion of hatchery coho on the spawning grounds is now being monitored with the start of the Mass Marking Program. The Cedar Creek (Lewis River) natural fish populations are now being monitored with both an upstream migrant trap installed in the Cedar Creek Fish Way and a downstream smolt migrant (screw) trap beginning in 1998. An attempt will be made to determine the interaction of naturally spawning hatchery coho with natural spawning coho with the ultimate goal of determining if limiting access of hatchery coho to the upper Cedar Creek watershed increases natural coho production. Secondly, to evaluate whether a stream (coho stock) strongly impacted by the genetics of hatchery fish changes (spawn timing, etc.) over a short period of time with the exclusion of hatchery fish (implement programs on other streams based on the data gathered from the Cedar Creek evaluation). Ecological interactions between program fish and natural fish will be addressed through Cedar Creek monitoring and evaluation measures proposed. Also, further on-going investigations of coho smolt residuals (emigration rates and release sites) and fall chinook predation by hatchery coho smolts in the Lewis River.

11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

To evaluate hatchery programs, comprehensive monitoring and evaluation programs are needed. These programs, at a minimum, must measure adult hatchery and wild escapement, and fishery contributions from hatchery and wild salmonids for every stock. Reproductive success should be measured for representative wild and hatchery stocks. Ecological interactions (predation, competition and disease) need to be measured for representative stocks as well. With the loss of Mitchell Act funding, staffing and logistical support may be lost to continue the monitoring and evaluation of this and other programs on the Columbia River. Current Fish Program staff is available to complete baseline monitoring and evaluation needs while research is on-going for coho interaction in the Lewis River.

11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring, evaluation and research follow scientific protocols with an adaptive management process (if needed). WDFW will take risk aversion measures to eliminate or reduce ecological effects, injury, or mortality as a result of monitoring activities. Most trap mortalities are the result of extreme environmental conditions that flood traps or equipment failure. WDFW will take precautions to make sure the equipment is properly functioning during the season. If environmental conditions are forecast that will cause high mortality then traps will be removed or opened up to allow unobstructed passage without mortality. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

Section 12. Research

12.1 Objective or purpose.

No research is planned (see Elochoman Type N coho HGMP)

12.2 Cooperating and funding agencies.

12.3 Principle investigator or project supervisor and staff.

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

12.6 Dates or time periods in which research activity occurs.

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8 Expected type and effects of take and potential for injury or mortality.

12.9 Level of take of listed fish: number of range or fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached “take table” (Table 1).

12.10 Alternative methods to achieve project objects.

12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities.

Section 13. Attachments and Citations

13.1 Attachments and Citations

- 1.) Becker, C.D. 1973. Food and growth parameters of juvenile Chinook salmon, *Oncorhynchus tshawytscha*, in central Columbia River. Fish. Bull. 71: 387-400.
- 2.) Berg, R. and D. Nelson. 2003. Mitchell Act hatcheries intake and fish passage study report. Washington Dept. of Fish and Wildlife. Olympia, Wa.
- 3.) Bilby, R.E., B.R. Fransen, and P.A. Bisson. 1996. Incorporation of nitrogen and carbon from spawning coho salmon into the trophic system of small streams: evidence from stable isotopes. Can. J. Fish. Aquat. Scit. 53: 164-173.
- 4.) Byrne, J. and H.J. Fuss. 1998. Annual coded-wire tag program Washington: Missing Production Groups. Annual Report 1998. Bonneville Power Administration, Portland, Or. Project Number 89-066. 107 pp.
- 5.) Durkin, J.T. 1982. Migration characteristics of coho salmon (*Oncorhynchus kisutch*) smolts in the Columbia River and its estuary. In: V.S. Kennedy (editor), Estuarine comparisons, p. 343-364. Academic Press, New York.
- 6.) Enhancement Planning Team. 1986. Salmon and steelhead enhancement plan for the Washington and Columbia River conservation area. Preliminary Review Draft.
- 7.) Finstad, A.G., P.A. Jansen, and A. Langeland. 2001. Production and predation rates in a cannibalistic arctic char (*Salvelinus alpinus* L.) population. Ecol. Freshw. Fish. 10: 220-226.
- 8.) Flagg, T.A., B.A. Berejikian, J.E. Colt, W.W. Dickhoff, L.W. Harrell, D.J. Maynard, C.E. Nash, M.S. Strom, R.N. Iwamoto, and C.V.W. Mahnken. 2000. Ecological and behavioral impacts of artificial production strategies on the abundance of wild salmon populations. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-41: 92p.
- 9.) Fresh, K.L. 1997. The role of competition and predation in the decline of Pacific salmon and steelhead. In D.J. Stouder, P.A. Bisson, and R.J. Naiman (editors), Pacific salmon and their ecosystems: status and future options, p. 245-275. Chapman Hall, New York.
- 10.) Fuss, H.J., J. Byrne, and C. Ashbrook. 1998. Stock characteristics of hatchery-reared salmonids and Washington Department of Fish and Wildlife Columbia River Hatcheries. Washington Department of Fish and Wildlife, Annual Report H98-03. 65 pp.
- 11.) Fuss, H.J. and P. Seidel. 1987. Hatchery incubation techniques at WDF hatcheries. Washington Department of Fisheries, Technical Report 100. 86 p
- 12.) Gregory, S.V., G.A. Lamberti, D.C. Erman, K.V. Koski, M.L. Murphy, and J.R. Sedell. 1987. Influence of forest practices on aquatic production. In E.O. Salo and T.W. Cundy (editors), Streamside management: forestry and fishery interactions. Institute of Forest Resources, University of Washington, Seattle, Washington.
- 13.) Hatchery Scientific Review Group (HSRG). 2004. Hatchery Reform: Principles and recommendations of the HSRG. Long Live the Kings, 1305 4th Ave., Suite 810, Seattle, Wa.

- 14.) Harza. 1999. The 1997 and 1998 technical study reports, Cowlitz River Hydroelectric Project. Vol. 2, 35-42.
- 15) Hershberger, W.K., and R.N. Iwamoto. 1981. Genetics Manual and Guidelines for the Pacific Salmon Hatcheries of Washington. Univ. of Wash. College of Fisheries. Seattle, Wa. 83 pp.
- 16.) Hochachka, P.W. 1961. Liver glycogen reserves of interacting resident and introduced trout populations. Can. J. Fish. Aqua. Sci. 48: 125-135.
- 17.) IHOT (Integrated Hatchery Operations Team). 1995. Operation plans for anadromous fish production facilities in the Columbia River basin. Volume III-Washington. Annual Report 1995. Bonneville Power Administration, Portland Or. Project Number 92-043. 536 pp.
- 18.) Johnston, J.M. 1967. Food and feeding habits of juvenile coho salmon and steelhead trout in Worthy Creek, Washington. Master's thesis, University of Washington, Seattle, Wa.
- 19.) Keeley, E.R. and J.W.A. Grant. 2001. Prey size of salmonid fishes in streams, lakes and oceans. Can. J. Fish. Aquat. Sci. 58: 1122-1132.
- 20.) Kline, T.C., J.J. Goring, Q.A. Mathisen, and P.H. Poe. 1997. Recycling of elements transported upstream by runs of Pacific salmon: $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ evidence in Sashin Creek, southeastern Alaska. Can. J. Fish. Aquat. Sci. 47: 136-144.
- 21.) Levy, S. 1997. Pacific salmon bring it all back home. BioScience 47: 657-660.
- 22.) Lister, D.B., and H.S. Genoe. 1970. Stream habitat utilization by cohabiting underyearlings of Chinook (*Oncorhynchus tshawytscha*) and coho (*O. kisutch*) in the Big Qualicum River, British Columbia. J. Fish. Res. Board. Can. 27: 1215-1224.
- 23.) Lower Columbia Fish Recovery Board (LCFRB). 2004. Lower Columbia salmon and steelhead recovery and sub-basin plan. Lower Columbia Fish Recovery Board, Washington state.
- 24.) Marshall, A. R., C. Smith, R. Brix, W. Dammers, J. Hymer, and L. LaVoy in Busack, C. and J.B. Shaklee, editors. 1995. Genetic diversity units and major ancestral lineages of salmonid fishes in Washington. Washington Department of Fish and Wildlife, Fish Management Program, Technical Report # RAD 95-02. 62 pp.
- 25.) Mathisen, O.A., P.L. Parker, J.J. Goering, T.C. Kline, P.H. Poe, and R.S. Scalan. 1988. Recycling of marine elements transported into freshwater systems by anadromous salmon. Verh. Int. Ver. Limnol. 23: 2249-2258.
- 26.) Miller, R.B. 1953. Comparative survival of wild and hatchery-reared cutthroat trout in a stream. Trans. Am. Fish. Soc. 83: 120-130.
- 27.) Muir, W.O. and R.L. Emmelt. 1988. Food habits of migrating salmonid smolts passing Bonneville Dam in the Columbia River, 1984. Regulated River 2: 1-10.

- 28.) NMFS (National Marine Fisheries Service). 1999. Biological Opinion On Artificial Propagation in the Columbia River Basin. National Marine Fisheries Service, Northwest Region
- 29.) NMFS (National Marine Fisheries Service). 2002. Biological opinion on artificial propagation in the Hood Canal and eastern Strait of Juan de Fuca regions of Washington State. National Marine Fisheries Service, Northwest Region.
- 30.) Nilsson, N.A. 1967. Interactive segregation between fish species. *In* The biological basis for freshwater fish production. *Edited by* S.D. Gerking. Blackwell Scientific Publications, Oxford. pp. 295-313
- 31.) Pearsons, T.N., G.A. McMichael, K.D. Ham, E.L. Bartrand, A. I. Fritts, and C. W. Hopley. 1998. Yakima River species interactions studies. Progress report 1995-1997 submitted to Bonneville Power Administration, Portland, Oregon. DOE/BP-64878-6.
- 32.) Pearsons, T.N., and A.L. Fritts. 1999. Maximum size of Chinook salmon consumed by juvenile coho salmon. *N. Am. J. Fish. Manage.* 19: 165-170.
- 33.) Peterson, G.R. 1966. The relationship of invertebrate drift abundance to the standing crop of benthic drift abundance to the standing crop of benthic organisms in a small stream. Master's thesis, Univ. of British Columbia, Vancouver, B.C.
- 34.) Piper, R. et al. 1982. Fish Hatchery Management. United States Dept. of Interior, Fish and Wildlife Service. Washington, D.C.
- 35.) Reimers, N. 1963. Body conditioning, water temperature and over-winter survival of hatchery-reared trout in Convict Creek, California. *Trans. Amer. Fish. Soc.* 92: 39-46
- 36.) Riley, S. 2004. Ecological effects of hatchery-reared juvenile chinook and coho salmon on wild juvenile salmonids in two Washington streams. *N. Amer. Jour. of Fish. Management* 24: 506-517.
- 37.) Taylor, E.B. 1991. A review of local adaptation in Salmonidae with particular reference to Pacific and Atlantic salmon. *Aquaculture* 98: 185-207.
- 38.) Sager, P.M. and G.J. Glova. 1988. Diet feeding periodicity, daily ration and prey selection of a riverine population of juvenile Chinook salmon, *Oncorhynchus tshawytscha*. *J. Fish. Biol.* 33: 643-653.
- 39.) Seidel, Paul. 1983. Spawning Guidelines for Washington Department of Fish and Wildlife Hatcheries. Washington Department of Fish and Wildlife. Olympia, Wa.
- 40.) SIWG (Species Interaction Work Group). 1984. Evaluation of potential species interaction effects in the planning and selection of salmonid enhancement projects. J. Rensel, chairman and K. Fresh, editor. Report prepared for the Enhancement Planning Team for implementation of the Salmon and Steelhead Conservation and Enhancement Act of 1980. Washington Department of Fisheries. Olympia, WA. 80pp

Cathlamet High School FFA Type N Coho Program HGMP

- 41.) Slaney, P.A., B.R. Ward. 1993. Experimental fertilization of nutrient deficient streams in British Columbia. In G. Schooner and S. Asselin (editors), *Le developpement du saumon Atlantique au Quebec: connaitre les regles du jeu pour reussir*. Colloque international e la Federation quebecoise pour le saumon atlantique, p. 128-141. Quebec, decembre 1992. Collection *Salmo salar* n°1.
- 42.) Slaney, P.A., B.R. Ward, and J.C. Wightman. 2003. Experimental nutrient addition to the Keogh River and application to the Salmon River in coastal British Columbia. In J.G. Stockner,(editor), *Nutrients in salmonid ecosystems: sustaining production and biodiversity*, p. 111-126. American Fisheries Society, Symposium 34, Bethesda, Maryland.
- 43.) Steward, C. and T.C. Bjornn. 1990. Supplementation of salmon and steelhead stocks with hatchery fish: a synthesis of published literature. Tech. Rpt. 90-1. Idaho Cooperative Fish and Wildlife Research Unit. University of Idaho, Moscow, ID.
- 44.) USFWS (U.S. Fish and Wildlife Service). 1994. Biological assessment for operation of U.S. Fish and Wildlife Service operated or funded hatcheries in the Columbia River Basin in 1995-1998. Submitted to National Marine Fisheries Service (NMFS) under cover letter, dated August 2, 1994, from William F. Shake, Acting USFWS Regional Director, to Brian Brown, NMFS.
- 45.) Ward, B.R., D.J.F. McCubbing, and P.A. Slaney. 2003. Evaluation of the addition of inorganic nutrients and stream habitat structures in the Keogh River watershed for steelhead trout and coho salmon. . In J.G. Stockner,(editor), *Nutrients in salmonid ecosystems: sustaining production and biodiversity*, p. 127-147. American Fisheries Society, Symposium 34, Bethesda, Maryland.
- 46.) Washington Department of Fisheries. 1991. Stock Transfer Guidelines. Hatcheries Program, Washington Department of Fisheries. Olympia, Wa.
- 47.) Washington Department of Fish and Wildlife (WDFW). 1987-2003. Semi-Annual Operations Reports for Lower Columbia Fisheries Development Program Mitchell Act Hatcheries (Washington State). Washington Dept. of Fish and Wildlife. Olympia, Wa.
- 48.) Washington Department of Fisheries (WDF), Washington Department of Wildlife (WDW), and Western Washington Treaty Indian Tribes (WWTIT). 1992. 1992 Washington State salmon and steelhead stock inventory (SASSI). Washington Dept. Fish and Wildlife, 600 Capitol Way N, Olympia, WA. 98501-1091. 212 pp.
- 49.) Washington Department of Fisheries (WDF) and Washington Department of Wildlife (WDW). 1993. 1992 Washington State salmon and steelhead stock inventory - Appendix three Columbia River stocks. Washington Dept. Fish and Wildlife, 600 Capitol Way N, Olympia, WA. 98501-1091. 580 pp.
- 50.) Washington Department of Fish and Wildlife (WDFW). 1997. Wild Salmonid Policy, draft environmental impact statement. Washington Dept. of Fish and Wildlife. Olympia, Wa.
- 51.) Washington Department of Fish and Wildlife. 1998. Water resource inventory area river mile indices for the Columbia and Snake river basins. Unpublished document. Habitat Management Division, Washington Department of Fish and Wildlife, Olympia, WA.

52.) Washington Department of Fish and Wildlife (WDFW). 2001 (updated Oct, 2003). Fisheries Management and Evaluation Plan (FMEP), Lower Columbia River. Washington Dept. of Fish and Wildlife. Olympia, Wa.

53.) Washington Department of Ecology. 2002. A guide to instream flow setting in Washington state. Olympia, Wa.

54.) Wipfli, M.S., J. Hudson, and J. Caouette. 1998 Influence of salmon carcasses on stream productivity: response of biofilm and benthic macroinvertebrates in southeastern Alaska, U.S.A. Can J. Fish. Aquat. Sci. 55: 1503-1511.

55.) Witty, K., C. Willis and S. Cramer. 1995. A review of potential impacts of hatchery fish on naturally produced salmonids in the migration corridor of the Snake and Columbia Rivers. S.P. Cramer and Associates, Inc., 600 NW Fariss, Gresham, Oregon.

56.) Wood, J.W. 1979. Diseases of Pacific Salmon, their prevention and treatment, 3rd edition. Washington Department of Fisheries, Hatchery Division, Olympia, Washington. 82 p.

Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

“I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973.”

Name, Title, and Signature of Applicant:

Certified by _____ Date: _____

Cathlamet High School FFA Type N Coho Program HGMP

Take Table 1. Estimated listed salmonid take levels by hatchery activity.

Fall Chinook

ESU/Population	Lower Columbia River Fall Chinook
Activity	Elochoman River Type N Coho- Future Farmers Of America Cooperative Program
Location of hatchery activity	Elochoman Hatchery
Dates of activity	October thru May (approximately 15 months)
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	0	nya
Intentional lethal take (g)	nya	nya	nya	nya
Unintentional lethal take (f)	nya	nya	0	nya
Other take (specify) (h)	nya	nya	nya	nya

- Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
- Take associated with weir or trapping operations where listed fish are captured and transported for release.
- Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
- Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
- Listed fish removed from the wild and collected for use as broodstock.
- Intentional mortality of listed fish, usually as a result of spawning as broodstock.
- Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
- Other takes not identified above as a category.

Cathlamet High School FFA Type N Coho Program HGMP

Take Table 2. Estimated listed salmonid take levels by hatchery activity.

Chum

ESU/Population	Lower Columbia River Chum
Activity	Elochoman River Type N Coho- Future Farmers Of America Cooperative Program
Location of hatchery activity	Elochoman Hatchery
Dates of activity	
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock) (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category

Cathlamet High School FFA Type N Coho Program HGMP

Take Table 3. Estimated listed salmonid take levels by hatchery activity.

Coho

ESU/Population	Lower Columbia River Coho
Activity	Elochoman River Type N Coho- Future Farmers Of America Cooperative Program
Location of hatchery activity	Elochoman Hatchery
Dates of activity	November – January
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	Up to 8*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	Up to 8*	nya
Intentional lethal take (f)	nya	nya		nya
Unintentional lethal take (g)	15,300*	13,923*	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

* Based on 90% egg to fry survival and 90% fry to smolt survival for the portion used for this 15 k program. .

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category